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ABSTRACT

A study was conducted at William Rainey Harper College (WRHC) in Illinois to follow former students who had taken one of nine different chemistry courses at WRHC between 1989 and 1993, and to survey area employers who were thought to hire employees with a chemistry background. Surveys were mailed to 853 students and 60 area employers. Study findings, based on responses from 55% of the students and 50% of the employers, included the following: (1) only 35% of the students took additional chemistry courses after transferring from WRHC, with the most commonly taken courses being organic chemistry, biochemistry, and general chemistry; (2) 38% of the transfer students majored in health-related areas, 23% in science, 13% in engineering, 9% in business, and 6% in social science; (3) 72% took the chemistry course(s) at WRHC because it was a degree requirement, and of these 81% felt they were well prepared by chemistry for their program; (4) 86% indicated that they were satisfied with their chemistry courses at WRHC, with 75% of the transfer students indicating that they had been at least well prepared for their subsequent chemistry courses; (5) 46% of the companies (N=14) surveyed had some positions requiring a chemistry background; (6) employers predicted a flat demand for employees with a chemistry background over the next few years; (7) six of the responding companies indicated a need for employees with additional background in instrumentation, three companies said their employees needed training in environment chemistry, and two companies indicated that their employees needed more background in biochemistry. The survey instruments are included. (KP)

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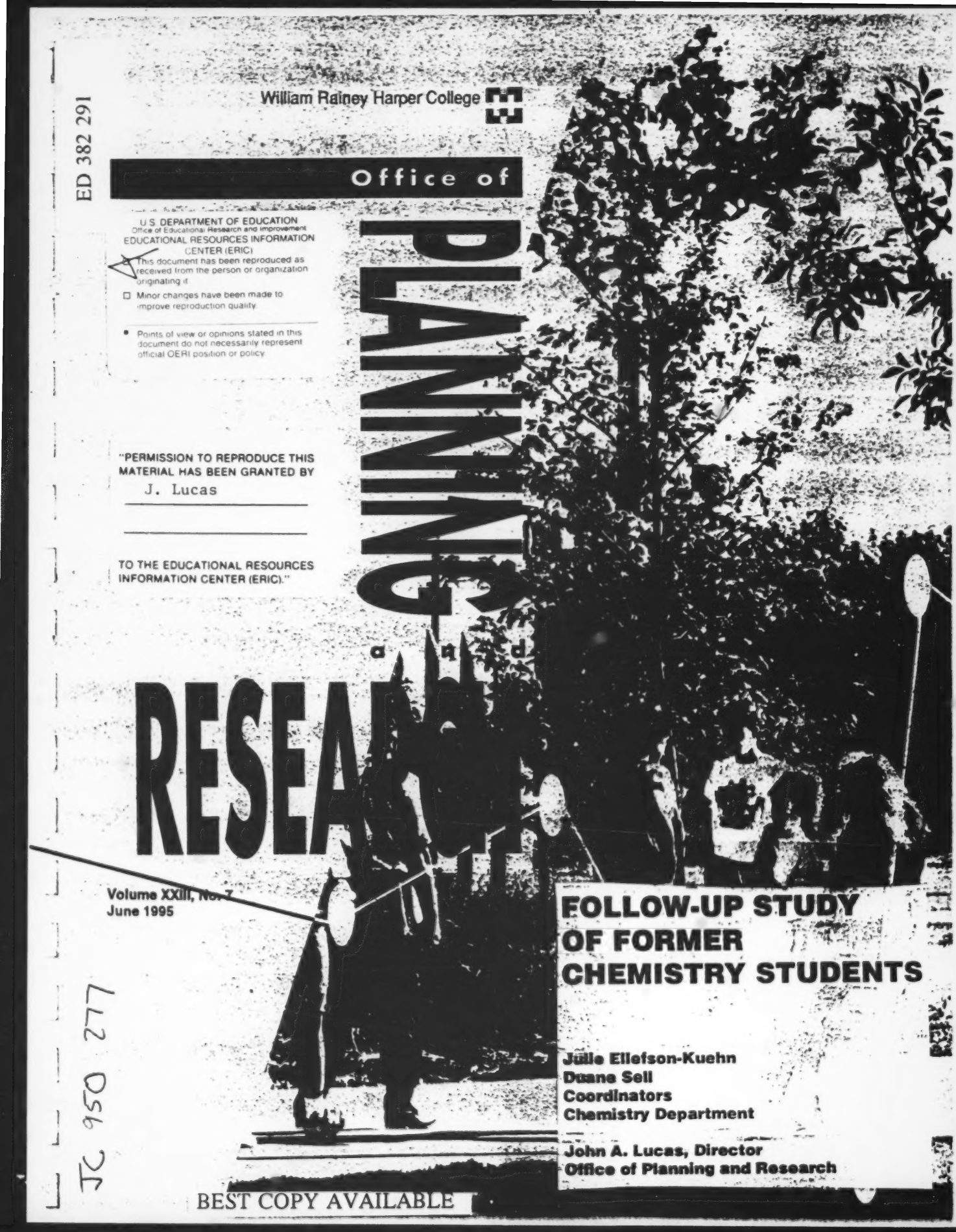

Volume XXIII, No. 2
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FOLLOW-UP STUDY OF FORMER CHEMISTRY STUDENTS

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JC 950 277

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ABSTRACT

The purpose of this study was to follow up former students who had taken one of nine different chemistry courses at Harper College between 1989 and 1993 and to survey area employers who were thought to hire employees requiring a chemistry background. Surveys were mailed to 853 students and after follow-up, 55 percent responded. Surveys were also mailed to 60 area employers and after follow-up, 50 percent responded.

Results of the survey showed that just a little over one-third of the students who take chemistry courses at Harper College take additional chemistry courses after transferring to another college and these courses are mainly organic, biochem and general. These students, for the most part, feel well prepared. About three-fourths of the students who transfer go into health related fields, science or engineering.

Three-fourths say they take chemistry because it is a degree requirement and seven out of eight students indicated they were satisfied with the chemistry course they took at Harper College.

The employer survey indicated there might be an employment market for associate degree students with a chemistry background and that there may be a chemistry enrollment market—especially for instrumentation, environmental chemistry and biochemistry—for employees in area firms.

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Purpose

The purpose of this study was to follow-up former students who had taken chemistry courses at Harper College and of employers who had positions requiring a chemistry background. The object of the study was one means of evaluating the program for Program Review.

Methodology and Population Surveyed

The survey instruments shown in the Appendix were jointly developed by faculty in the Chemistry Department and the Office of Planning and Research. The student sample was selected as follows: A random sample of 100 was selected among students who had taken Chemistry courses 100, 110, 121, 122, 131, 132, 201, 204 and 205 from 1989 through 1993. Only 53 had taken Chemistry 132 so all of those students were selected. Thus, the entire sample consisted of 853 former students.

After two mailings of the survey and a follow-up telephone call, 467 completed surveys were obtained for a 55 percent response rate. The employer sample was chosen by first selecting all employers with 50 or more employees in Harper's district. From this list the Chemistry Department selected 60 employers they felt were most likely to have positions requiring a chemistry background. After two mailings, 30 employers completed surveys for a 50 percent response rate which is extremely high for an employer survey.

Discussion of Results – Student Survey

Only 35 percent of the students took additional chemistry at colleges after transferring from Harper College. The most commonly taken courses at these colleges were organic chemistry, biochemistry and general chemistry. About three-fourths of these students who took additional courses after transferring felt they were at least well prepared for these courses. The reasons for being less than well prepared were varied.

The majors of these students after transferring were distributed as follows: health related areas (38%), science (23%), engineering (13%), business (9%), social science (6%) and all other (11%). Among the health related area majors, 34 percent were in nursing, 17 percent in pharmacy and 12 percent in medicine. Among the science majors, 64 percent were in chemistry or biology and in engineering 62 percent were in chemical or electrical.

When asked why they took a chemistry course at Harper College, 72 percent indicated it was a degree program requirement. Half of these degree program requirements were in health programs, 29 percent were in science programs and 14 percent were in engineering programs. The largest group in the health related programs was nursing (43%) followed by pharmacy (18%). Among those who took chemistry because it was required by their degree program, 81 percent said they were well prepared by chemistry for their program. Only 7 percent of this group saw no connection between chemistry and their degree program. This group that saw no connection between chemistry and their degree program were less likely to be health area or science majors and more likely majors other than health science or engineering.

When asked to rate their satisfaction with the chemistry courses they took at Harper College, 86 percent were satisfied. Those that were not satisfied were less likely to be engineering majors and much less likely to be taking chemistry because it was required in their degree program. Forty-five percent of the respondents offered additional comments. Many of the comments centered around four themes:

a) positive comments about the full-time faculty
b) complaints about the labs
c) the variability of the preparation level of students taking chemistry
d) the variability in the quality of the part-time faculty

Discussion of Results - Employer Survey

What is not known with these results are:

a) will the 30 companies not responding be like the 30 companies responding
b) will any of the 1,151 companies not picked by the department require any of their employees to have a chemistry background.

Thus it is not easy to project the numbers from the survey respondents to the entire employer population. Almost half of the respondents (14 companies and 47%) required some 149 of their employees to have a chemistry background. Some 44 of these positions (30%) require only basic chemistry for technicians, lab professionals, and other professionals. Only two companies - representing 66 employees with chemistry background - have ever hired students educated at Harper College.

When asked to forecast the future of hiring different level of chemistry backgrounds, the demand seemed to be flat for the next few years, so therefore, the demand will not increase or decrease. However, when asked for areas in which current employees need additional chemistry education, six companies - representing 132 employees with a chemistry background - answered their employees needed additional background in instrumentation. Another three companies - representing 45 employees - said their employees needed environmental chemistry and two companies - representing 54 employees - indicated their employees needed more background in biochemistry. Thus, there may be an opportunity to market certain chemistry courses to the corporate sector and maybe an opportunity for associate degree graduates with chemistry to find jobs as technicians.

Major Conclusions

Just a little over a third of the students who take chemistry courses at Harper College take additional chemistry courses after transferring to another college and these courses are mainly organic, biochemistry and general. These students, for the most part, feel well prepared. About three fourths of the students who transfer go into health related fields, science or engineering.

Three fourths say they take chemistry because it is a degree requirement and seven out of eight indicate they were satisfied with the chemistry course they took at Harper.

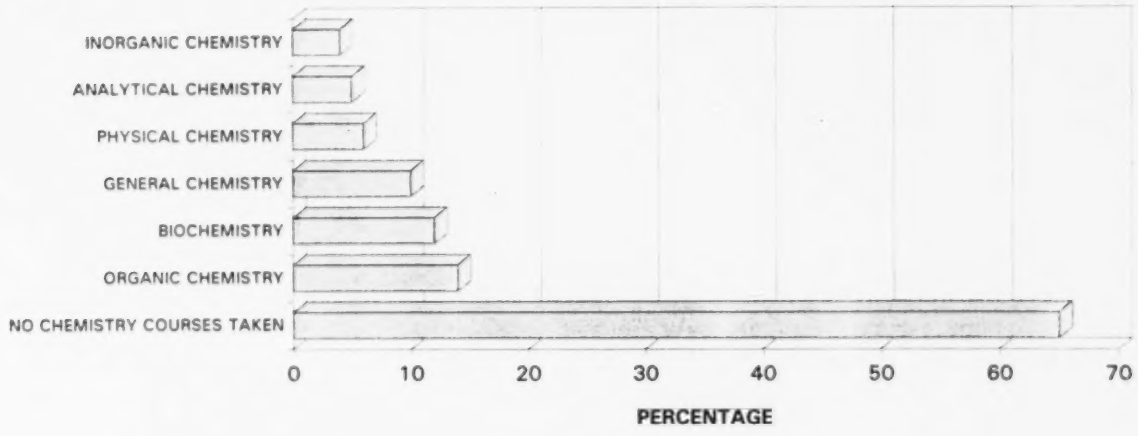
The employer survey indicated there might be an employment market for associate degree students with a chemistry background and that there may be a chemistry enrollment market - especially for instrumentation, environmental chemistry and biochemistry - for employees in area firms.

Survey of Students Completing Chemistry at Harper College

Chemistry courses taken at other colleges after leaving Harper College

Course	N	Percent of 461	Course	N	Percent of 461
None	299	64.9	Human Anatomy	1	.2
Organic Chemistry	64	13.9	Physiology	1	.2
Biochemistry	56	12.1	Semi-conductor design	1	.2
General Chemistry	48	10.4	Hazardous Mat'l Chemistry	1	.2
Physical Chemistry	28	6.1	Chemistry for Hlth. Sciences	1	.2
Analytical Chemistry	22	4.8	Advanced Inorganic	1	.2
Inorganic Chemistry	20	4.3	Many Chemistry courses	1	.2
Instrumentation	10	2.2	Computer database for Chem.	1	.2
Medicinal Chemistry	8	1.7	Library-Sci. in Chemistry	1	.2
Environmental Chemistry	7	1.5	Independent Study	1	.2
Bioanalytical Chemistry	4	.9	Human Nutrition Biochem.	1	.2
Clinical Chemistry	3	.7	Solid State Electronic Devices	1	.2
Chem. Aspects of Drug Action	2	.4	Pre-professional Chemistry	1	.2
Microbiology	1	.2	Qualitative Analysis	1	.2

CHEMISTRY COURSES TAKEN AT OTHER COLLEGES AFTER TRANSFERRING FROM HARPER



For Those Taking Chemistry After Transferring from Harper College

How Well Harper Prepared Them	N	PCT
- Very well prepared	48	31.2
- Well prepared	68	44.2
- Somewhat prepared	29	18.8
- Not prepared at all	9	5.8
Total	154	100.0

- 37 Offered comments on specific ways they were not prepared
- 3 Mentioned inadequate lab experience
- 2 Mentioned needing background in thermodynamics
- All other comments were different

Areas in Which Students were not Prepared

-- Latice structures entropy, kinematics of electrons of holes within latice structures.
-- The instructors might want to include more real use examples of the chemistry they are learning, i.e., organic chemistry - what the functional groups do and inter relate with one another.
-- I felt clueless -- all of it.
-- The two courses were very different areas of chemistry so it is difficult to say.
-- Lab experience not even close to prepared!
-- Overall mechanism of reactions.
-- It has been four years since I took the course so I cannot remember specific areas. I just felt the class was not challenging.
-- All aspects of chemistry.
-- I dropped the class.
-- Better than a lot of other people from other schools.
-- Had taken the chemistry course during the summer so it was condensed. The course at U of I was a follow-up to the one at Harper.
-- Took organic chemistry at another school and biochemistry at yet another school - was well prepared for both.
-- Introduce IR and NMR in detail -- depth of material.
-- How organic chemistry applied to biochemistry and nursing.
-- Theory all right but laboratory practices should have tied in more to current theoretical topic being studies. Do not feel solid with my Harper background in labs.
-- Teaching style - help harder to come by at the 4-year school.
-- The teachers were not very much less helpful and considerate while teaching at the other college.
-- Lab - was not familiar with organic molecular structures.
-- Not prepared for advanced chemistry classes.
-- The workload should have been more - the lab courses should cover more purification and analysis of chemicals.
-- Chemical compound interaction and diagrams.
-- Thermodynamic theory - concepts and applications - example - Maxwell relations. Physics department should have introduced P Chem a little more.
-- The organic chemistry was not strong enough for the biochem class I took - not thorough enough.
-- Physical chemistry - had chemistry but it had thermodynamics and physics but as far as chemistry - Harper prepared me.
-- My teacher possessed a doctorate in chemistry - it seemed near impossible for him to come down to the class level of learning.
-- I feel Harper needs a quantitative chemistry class or make it a stronger part of a chemistry class.
-- The electrical engineering aspects of the chemistry we used just were not something any non-electrical engineer needs to learn.
-- Metabolism of nutrients
-- Inorganic chem was a little weak, too simplistic. A more rigorous course would be good.
-- Mathematical background related to advanced chemistry classes.
-- Mechanisms of reactions.
-- The instructor was not efficient.
-- Orbital theory.

Major of Students After Transferring

Health Fields (110) - 38%

Nursing	37 - (34%)
Pharmacy	18.5 (17%)
Medicine	13 (12%)
Medical Tech	7
Dietetics/Nutrition	4.5
Physical Therapy	4
Physicians Asst.	4
Chiropractic	4
Health Administration	2
Kinesiology	2
Veterinary Science	2
Dentistry	2
Clinical Lab Tech	1
Health Science	1
Occupation Therapy	1
Allied Health	1
Crtotechnology	1
Nuclear Medicine	1
Recreation Therapy	1
Prosthetics	1
Dental Lab Tech	1
Ultrasound	1
Respiratory Therapy	1

Engineering (38) - 13%

Chemical Engineering	12.5 (33%)
Electrical Engineering	11 (29%)
General Engineering	4.5
Mechanical Engr.	4
Civil Engineering	4
Environmental Engr.	1
Aeronautical Engr.	1

Business (25) - 9%

Business Management	13
Computer Info. Sys.	3
Marketing	3
Accounting	2
Hospitality Mgmt.	2
Transportation Mgmt.	1
Occupational Safety	1

Social Sciences (16.5) - 6%

Psychology	11.5
Anthropology	2
Indus. Psychology	1
Sociology	1
Military History	1

Non-Medical Technology (4) - 1%

Industrial Tech	1
Electrical Engr. Tech.	1
Technical	1
Applied Science	1

Architecture (2) - 1%

Interior Architecture	1
Landscape Architect.	1

Agriculture Related (2) - 1%

Agriculture	1
Horticulture	1

Public Services (7) - 2%

Criminal Justice	3
Social Work	2
Fire Science	1
Public Administration	1

Science (68) - 23%

Biology	23 (34%)
Chemistry	11.5 (17%)
Biochemistry	9 (13%)
Computer Science	5
Earth Science	3
Zoology	3
Physics	3
Molecular Biology	2 (3%)
Science	2
Paper Science	1.5
Hydrogeology	1
Lab Science	1
Math	1
Biostatistics	1 (1%)
Marine Science	1

Education (8.5) 3%

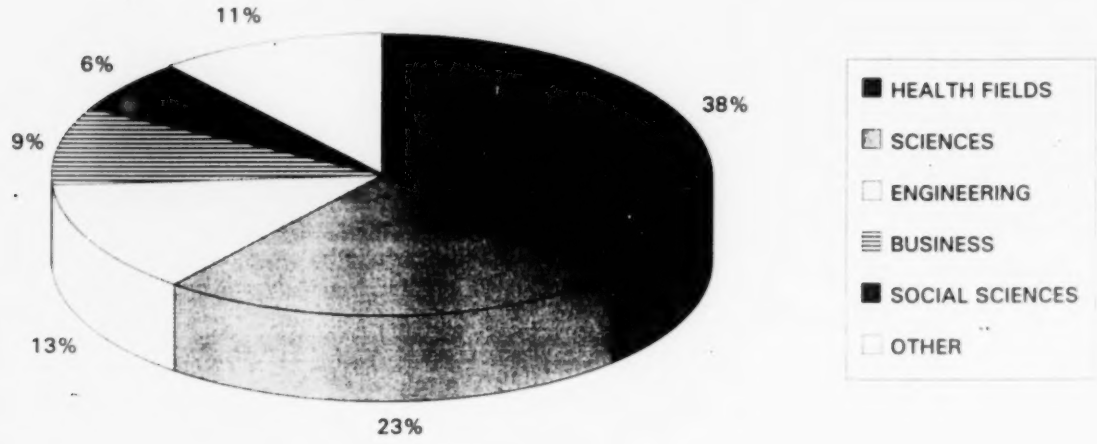
Elementary Education	4
Education	2.5
Chemistry/Biology Education	1
Secondary Math Education	1

Communication and the Arts (7.5) - 3%

Speech/Communications	3
Liberal Arts	2
English	2.5
Spanish	.5
Music	.5

Total 288.5 100 percent

MAJOR OF STUDENTS AFTER TRANSFERRING



Why Students Took Chemistry Course at Harper	N	PCT
- Required for degree program	335	72.0
- To satisfy a lab science requirement	64	13.8
- Have a particular interest in this chemistry course	33	7.1
- General education elective	14	3.0
- Refresher and preparation for chemistry at transfer college	11	2.4
- Replace "F" in chemistry at another institution	4	.9
- Needed chemistry course for employment situation	4	.8
	465	100.0

WHY STUDENTS TOOK CHEMISTRY

Program at Harper for Which Chemistry was Required

Health Programs - 159 (49.9%)		
Nursing	69	43.4%
Pharmacy	29	18.2%
Medicine	13	8.2%
Physical Therapy	12	7.5%
Dietetics	6	
Medical Technology	6	
Dentistry	6	
Chiropractic	5	
Dental Hygiene	5	
Veterinary Science	2	
Veterinary Tech	1	
Cardiac Exer. Tech	1	
Physician Assist.	1	
Nuclear Medicine	1	
Health Administration	1	
Public Health	1	

Science - 92 (28.8%)		
AS	38	41.3%
Biology	26	28.3%
Chemistry	12	13.0%
Biochemistry	8	
Computer Science	2	
Microbiology	1	
Zoology	1	
Geology	1	
Meteorology	1	
Environmental Sci.	1	
Paper Science	1	

Engineering - 44 (13.8%)		
General Engineering	20	45.5%
Electrical Engr.	11	25%
Chemical Engr.	10	22.7%
Mechanical Engr.	2	
Aeronautical Engr.	1	

Other - 24 (7.5%)		
AA	10	41.7%
Education	5	
AAS	2	
Sports Info.	1	
Library Sci.	1	
Computer Sys.	1	
Business	1	
Public Admin.	2	
Fashion Design	1	

Total -- 319 100 percent

For those who took a Chemistry course
because it was required for their degree program,
the degree to which they were adequately prepared

	N	PCT
- Very well prepared	115	31.4
- Well prepared	184	50.3
- Somewhat prepared	49	13.4
- Not prepared at all	18	4.9
Total	366	100.0

Specific areas where student felt "Not Prepared"

-- Did not complete the class due to a family crisis; however, I have my undergraduate degree and believe the chemistry course work was very thorough.
-- Same as above, especially the basics such as the naming structure of compounds & individual elements.
-- Organic chemistry might want to update teaching style, use more updated materials, films, books, etc.
-- Found course extremely difficult and the course was not a major emphasis in my major after I completed it.
-- I get into the habit of not reading the text and depending only on lecture.
-- Second semester chemistry was not in-depth as first semester because I took it during the summer.
-- As a returning student after 25 years, any science was a clear slate for me.
-- Lab reports
-- Needed more knowledge of transaction metals.
-- Chemistry 110 was a good stepping stone for Chemistry 131 and 132.
-- It is hard to say for sure because I have yet had to apply any chemistry.

Specific areas where student felt "Not Prepared" (cont'd)

-- I went to class only one day and then dropped all my courses.
-- I have a good background but the class did not include specific nursing application.
-- Organic is very different than general - one cannot compare.
-- Thermodynamic theory - concepts and applications -- example: Maxwell Relations. Physics Department should have introduced P Chem a little more.
-- Believed it was good enough for her needs in Nursing.
-- I was not confident in my balancing of equations, special situations seemed to come up making me confused about doing them correctly. Also, I was confused about what elements it was impossible to mix, meaning where reactions did not occur.
-- Chemistry was the subject I did least well on for medical college admission test.
-- Course was more difficult then he expected.
-- Calculus should be a pre-requisite for all classes above general chemistry.
-- My degree program is not strongly based on chemistry.
-- Duane Sell is one of the best science teachers I have had all through school.
-- Organic 204, too fast - 1 chapter a seminar. It should be broken up a little.
-- Inorganic chemistry - calculations - organic chemistry - organic reactions and basic.
-- Took both general chemistry and organic chemistry at Harper and my teacher for general chemistry was not helpful at all.
-- Math level was below NEC.
-- The course work in 131 and 132 seemed to cover everything that I believe will prepare me for further use.
-- Math
-- I never have been comfortable with story problems that would be only unprepared area.
-- Understanding the equations.
-- Isotopes, units of measure.
-- Lecture at Harper - vague.
-- Lab and text
-- Human chemistry
-- As far as what the class covered - it was very thorough and concise - it is a very solid foundation for further chemistry classes.
-- Enjoyed the way the course and materials were presented. Hands-on experiments helped my understanding of the subject.
-- Again courses were not quite rigorous enough. Homework assignments were too short. Lab write-up requirements not up to 4-year expectation.
-- Chemistry 122 was very tough and I did not learn much because I had a terrible instructor.
-- Pre-labs.
-- Teacher was not specific enough
-- Did not feel that there was enough explanations and day-to-day experiences by teacher.
-- The time allotted for teachers to each restricted them from answering specific questions.

For those who took this Chemistry course at Harper because it was a degree requirements, the connection they saw between this Chemistry course and the degree program

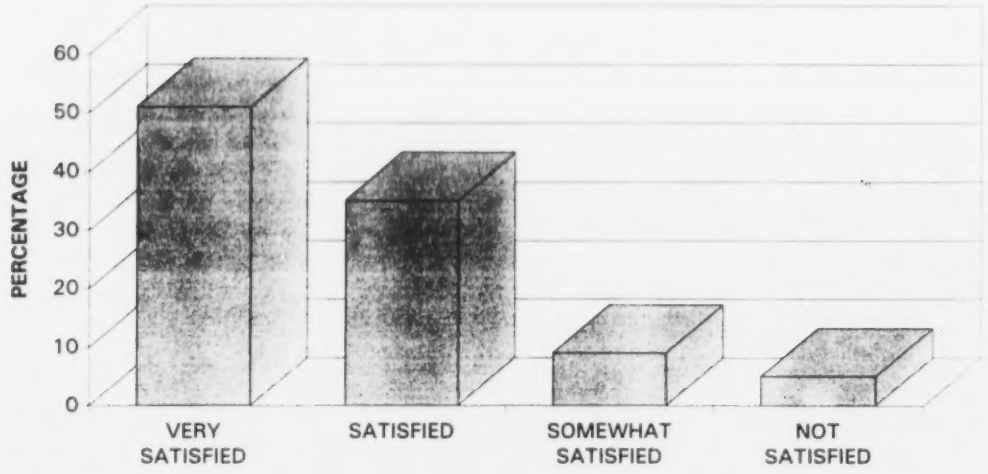
	N	PCT
- Very close relation	84	24.8
- Close relation	117	34.5
- Somewhat related	114	33.6
- Not related	24	7.1
Total	339	100.0

Harper majors of those saying Chemistry was not related to their degree program

Majors	N	Sub-Total Percent	Total Percent
Health Areas:	(8)	(100)	33.3
Nursing	5	62.5	
Cardiac Exer. Tech	1	12.5	
Physical Therapy	1	12.5	
Dentistry	1	12.5	
Science	(4)	(100)	16.7
A.S.	2	50.0	
Biology	1	25.0	
Computer Science	1	25.0	
Engineering	(4)	(100)	16.7
Electrical	2	50.0	
Mechanical	1	25.0	
General	1	25.0	
Other	(8)	(100)	33.3
Liberal Arts	2	25.0	
Elementary Educ.	2	25.0	
Sports Information	1	12.5	
Marketing	1	12.5	
Business	1	12.5	
Music/Business	1	12.5	
Total	24		100.0

Satisfaction with Chemistry Course at Harper	N	PCT
- Very satisfied	225	50.7
- Satisfied	157	35.4
- Somewhat satisfied	41	9.2
- Not satisfied	21	4.7
Total	444	100.0

SATISFACTION WITH CHEMISTRY COURSE AT HARPER



Majors of those not satisfied	N	Sub-Total Percent	Total Percent
Health Areas	(7)	-(100)	41.2
Nursing	5	71.4	
Dietetics	1	14.3	
Dental Hygiene	1	14.3	
Science	(5)	(100)	29.4
Biology	2	40.0	
Earth Science	1	20.0	
Zoology	1	20.0	
Chemistry	1	20.0	
Engineering	(1)	(100)	5.9
General	1	100	
Other	(4)	(100)	23.5
Sociology	1	25.0	
Criminal Psychology	1	25.0	
Social Work	1	25.0	
Business	1	25.0	
Total	(17)		100.0

Reason for Taking Chemistry at Harper	N	Percent
-- For those not satisfied with their chemistry course		
- Required for degree program	11	52.4
- To satisfy a lab science requirement	2	9.5
- Have a particular interest in this chem course	3	14.3
- A general education elective	3	14.3
- To replace an "F" at another institution	1	4.8
- As a refresher for chemistry to be taken at institution transferring to	1	4.7
Total	21	100.0

Interpretation of Comments:

1- A lot of positive comments especially about full-time faculty
2- A lot of complaints about labs
3- A lot of variability in student's preparation for Chemistry
4- A lot of variability in quality of part-time faculty - some cannot understand their English.

Comments -- Suggestions for Improvement

-- I did not finish the class - I do not remember the equipment -- sorry.
-- New eye goggles, lab aids to help during lab -- sometimes the teacher becomes too busy to help all the students.
-- Update existing organic teaching style. It must be taught in a more updated and exciting way. Understanding that the material must be learned, why not make it fun while you are at it. Chemistry is life - everything movement of the body is chemistry. What an awesome subject to share with others.
-- Please offer some higher chemistry courses.
-- I really cannot comment - I just know I was not prepared for medical school - biochem. Also I heard that Harper's chemistry classes are a "joke" compared to other 4-year universities in Illinois. I heard this from friends. I hope this helped.
-- I cannot express my gratitude enough for the dedication and hard work of the professors I had in both chemistry courses I took. Their building blocks helped me get an "A" in biochem at UIC.
-- The course I took was basic chem, for those of use who did not feel up to college-level chem. I did terribly in high school chemistry but very well in this course. The lab work could have been more challenging, though.
-- More interaction - student/teacher - during experiments.
-- I felt my teacher was trying to make new experiments and show us different things. I took Chemistry 100, Mr. Macaulay.
-- Teacher was moving too fast and the text was too in-depth for a semester course.
-- Nothing - course presented extremely well and I was given a lot of extra help by the instructor - Barbara Bakel - She was wonderful and really cared. She made the world of chemistry beautiful, not a word to be dreaded. Since then, I took microbiology and human anatomy and physiology 1 and 11 at Oakton and I seemed to know quite a bit more about the chemistry chapters than most of the others in the class. I never would have passed these three courses if it had not been for Barbara Bakel.
-- More time explaining lab concepts and procedures.
-- I am impressed with your computer system and its access to information. I took chemistry at Harper in summer '91 to satisfy a lab science requirements at UIC and have had no contact with Harper since then. You even have my changed address. Wow!
-- Go smaller - stress the basics and cover a more selected area slower rather than tons of different fields of chemistry fast. Even if it means having two sequences such as chemistry for engineers and chemistry for chemists. Designate specific chemistry courses for each individual major, i.e., chemistry for electrical engineer, chemistry for chemists. All in all, chemistry at Harper was very interesting, just vague.
-- Better eye protection at labs - existing goggles were scratched and hard to see clearly.
-- I learned a lot from Deepa Bodambe class. She was a good teacher and met all my expectations for organic chemistry.
-- I have no suggestions for improvement. My experiences in organic chemistry at Harper College were very educational and beneficial. I would recommend both organic chemistry I and II to anyone. The laboratories were well equipped, and greatly aided in my understanding of the courses. Deepa Godambe and Michael Oester were two of the most outstanding instructors I have had the pleasure of meeting.
-- Overall, I liked the course very much.

Comments -- Suggestions for Improvement (cont'd)

-- Took the course quite a few years ago so it is hard to remember exactly. Course instructor was very helpful though and understanding. Realized the difficulty of the course and worked with students well.

-- I was satisfied with my chemistry class -- my only suggestion was to make peer study groups a required event. The student learns a great amount from the professor but also can develop a better understanding when they have their peers to study with.

-- Did not finish degree program - Chemistry is a very hard subject for me to grasp so my opinions would not help you, but I feel nursing does not require such in-depth study.

-- Nothing -- Dr. Wilcox was very well prepared for this course and she also was very helpful to all of the students. I hope that all of Harper's Chemistry courses are run as well as the one I took -- Chemistry 110.

-- In Chemistry 121 and 122, the labs were boring to the point where I hated to go to the lab. Now that I am in CHM/204, I look forward to lab because of the type of experiment and the greater challenge.

-- Do not let the teacher I had teach the CHM/101 class. His explanations were always too complicated to understand. Also, for the majority of the class time re-doing the homework problems from the class before, when all we needed was an understandable explanation.

-- At Purdue University - where I attend - for lab, we have a lab notebook which requires us to write up the experiment and look up various information about all the chemicals used. As for lecture, I learned a basic concept of organic, but I was not where close to being prepared for the second semester organic course I struggled in. I should have retaken the first semester organic at Purdue and used Harper as an introductory course. I would never recommend some one to take a science course to fill a requirement in their major at another university.

-- The majority of the course focused on nomenclature and identification which was literally only two weeks of an entire year of organic chem at the University of Illinois at Chicago.

-- I felt it was too much like high school.

-- I attempted organic chemistry but I withdrew midway through the course. I did not feel my teacher was an adequate teacher.

-- Get professors who are serious about teaching chemistry. My professor was more interested in his play and commercial voice-overs than he was about chemistry.

-- Field work -- if possible.

-- Excellent teacher -- a demonstration - by means of a skit - of a typical lab assignment in progress, prior to first lab. Myself and other females seemed much slower at getting started in labs and experienced people were constantly several steps ahead of others. So with sharing certain parts of lab assignments, it was hard, to get the sense of some assignments when your partner was already cleaning up and you were still on steps 2 or 3. Maybe groups should be formed of people with similar experience and abilities to encourage those eager and able to push ahead, while inexperienced others would benefit mutually at slower paces.

-- After trying to take this course in the evening and dropping it because of the way it was being taught, I again attempted it with Mr. Macaulay. Every teacher in the Science Department could benefit from observing his teaching technique. I left his class with a thorough understanding of chemistry and would definitely enroll in another class he was teaching because I know it would be very well taught and I would learn what was necessary. I have never had a better teacher at Harper College - he is truly an asset to your department.

-- Nothing - I felt the class was organized well.

-- Felt very confused and think it should have been put in simpler terms.

-- During my second semester chemistry, the instructor did not really have a lecture. I did get a lot out of the two classes -- they were challenging.

-- As much as possible lab work as can be regularly arranged.

-- Have people take math refresher course before taking this course.

-- Upper level classes seemed to be structured to emphasize theory rather than actual laboratory practice. Perhaps there should b e more emphasis on the theory behind early experiments.

Comments -- Suggestions for Improvement (cont'd)

-- I took CHM/100 with B.Bakel and enjoyed her and the course thoroughly. I learned a lot in a very comfortable, open style classroom. I took an intro to organic chem course through Harper at Triton in fall 1993 and it was terrible. The lab facilities at Triton did not compare at all with Harper's - there was always missing equipment from our drawers, and the equipment was always dirty! There was no safety program at Triton, either (film, or review of location of fire extinguisher, first aid kit, etc.) - Harper's program and instructors were far superior.

-- More report style format for labs. Knew more than most on how to do lab and about chemistry in general though had hard time with making a 20-page write up about it.

-- Add more instructors to make it easier to schedule classes.

-- It was great.

-- I really enjoyed this class immensely due to the superb teaching of David Macaulay. I learned a lot and it was fun although not easy. Dave Macaulay made it very understandable. Also, this class did prepare me for some of my other classes, especially microbiology. It was very interesting.

-- Maybe a few in-class demonstrations. Basically, anything that would spice up the lecture portion of the course.

-- Chemistry 125 was a fairly new course, but it was presented well. This course probably should not have been taught during the summer because of its degree of hardness.

-- Keeping the same instructor throughout the class - we became a self-study class when our instructor left for a seminar. There was no continuity.

-- Instructor for CHM/202 did not stick to the book. Notes from the library were used and were very poorly prepared, extremely difficult to understand. Book was hardly used at all and it was upsetting to say the least.

-- Smaller class size.

-- Since I did not have any previous chemistry, the course (summer) moved too fast for me. I dropped out of the class after 3 weeks - I was completely lost.

-- The teacher was excellent and made, what for me was going to be a boring class, interesting.

-- A different teacher.

-- I cannot think of anything to improve the course. I only wish that the university I am currently attending had been modeled after Harper. I also wish Harper was an accredited school and then I would not be concerned with how prospective medical schools will judge my grades. I have a bachelors degree from U of I in Champaign/Urbana and I found the learning environment at Harper much more rewarding due to the small class sizes and intimacy with which the teachers are willing to approach their students. I enjoyed my year at Harper studying in-organic chemistry and feel that the method of education with a stress on multiple learning tools - mixed media, film, models, group discussions, vital teacher/student interaction, etc. - far superior to my experience this year so far as U of I in Chicago. If I could have ever enrolled in the biology course which always fills due to nursing students, I would still be at Harper. I hear organic chemistry is good there.

-- Explanation of the labs in detail - especially the vanadium experiment!

-- I am still a student at Harper College and I do not know how Harper courses have prepared me for future chemistry courses.

-- Dr. Oester taught my organic chemistry class at Harper. He was an excellent instructor. He encouraged class participation and gave weekly quizzes as well as exams. The quizzes helped prepare for exams. I would recommend Harper's Chemistry Department. It was a great course and an excellent instructor. I was well prepared for biochemistry at Midwestern University. Thank you Harper!

-- Lecture was extremely boring and needs to have something more than just plain lecturing. Lab was OK, not too difficult. Overall, chemistry was pretty decent.

-- I was more satisfied with the organic chemistry courses that I had than the inorganic chemistry.

Comments -- Suggestions for Improvement (cont'd)

I guess a good way to improve the course is to have teachers who are knowledgeable enough to teach the course and make students to understand the material.

-- I have to admit that it has been too long ago for me to remember specifics. All that I can recall is the relative vagueness of the topics presented - classes have to be into more detail to prepare students for college level science.

-- Have instructors that are better able to communicate with the students in terms of the language barrier.

-- I was completely satisfied with Harper's chemistry program; however, I believe that it is necessary to have a quiz on every chapter in CHM/131/132 scheduled consistently on every Tuesday or Wednesday. This was the case in Harper's organic chemistry course and I believe it motivated me to prepare for the material before the exams. Although I did not take any more chemistry courses, I did have the chance to look at several exams at my next institution. Harper's material was much more detailed.

-- Re question five -- I cannot answer this -- I already have a minor in chemistry, but was required by dental hygiene to take CHM/100 because my credit was more than 5 years old. I could have taught the class. I was not allowed to test out because it was a laboratory class. Overall, it was a very frustrating experience. One of the reasons I could not have this course waived was that it included one chapter of biochem, which I have never had - although I have had 1-1/2 years of organic chemistry. It turned out we had to skip the chapter on biochem because we had fallen behind schedule. This course was a waste of my time and money. Can't you come up with ways around situations like this? Frankly my high school chemistry courses were more advanced than this course. The teacher, however, was good.

-- Dropped one course. Teacher could not speak English very well.

-- I really cannot think of anything to suggest here. From what I recall, the courses, CHM/131/132 were very complete, challenging, and satisfying.

-- I realize that Harper's Chemistry student population does not consist primarily of Chemistry majors; however, for those of us who are I feel a more in-depth discussion relating to fundamental topics is warranted.

-- Say "Hi!" to Duane and Julie -- tell them this is hard, very hard.

-- The teacher was very good but she had a little trouble explaining certain theories.

-- Easier to understand/read textbook.

-- Instructor had a low patient level - very short with some students.

-- Teacher was ineffective.

-- Leave it as is.

-- Harper has much better facilities and courses than many 4-year institutions. It would be very nice if Harper were a 4-year school. I would pay more money for courses if it were. All the classes I took at Harper were excellent.

-- Better preparation for labs (w/students).

-- Make lab sections smaller - fewer people in the lab would allow a student to obtain help from the instructor easily. Working conditions in a less crowded room would be beneficial. I would like to see students working the "unknowns" giving him/her the incentive to finish the experiment and to accurately compile data for results and solutions. This would force the student to think about the reaction.

-- More stress should be given on presenting the information in well organized and simple ways, covering important topics, than throwing lots of information, which is not necessary. Class discussion.(input from each student) about each topic covered will bring confidence in them and will present a good picture of the subject covered, than students walking out of the class with a vague idea of various topics covered in class after each lecture.

-- Still at Harper -- transferring to UIC in fall '95.

Comments -- Suggestions for Improvement (cont'd)

-- 1- More individual attention 2- Movies (16mm) that were up-to-date 3- Class moved too much at the speed of those who "got" chemistry concepts and left the others behind.

-- Teacher was ineffective. Could not get a grasp on general chemistry/testing was poor. Asked students to figure out problems that he did not understand.

-- Chemistry lab should have more equipment for lab. Student should work individually. Student should be tested on the knowledge after each lab and have to write a lab report.

-- If you could get an intermediate polymer chemistry course that focuses more on properties and relations between organic compounds it would be helpful to some industrial lab bound students. DePaul offers a Masters degree in Chemical Coating Technology.

-- The lectures would be better if they started at 9:00 instead of 8:00 -- too early for lecture. Taking more quizzes - more detailed discussion on the lab assignments.

-- I plan on taking organic chemistry next semester. I would appreciate it if the course was offered at Harper. I understand that the first course in organic chemistry is offered in January only each year at Harper.

-- Go over commonly used drugs better.

-- Offer more classes in this area - they get filled up too fast along with biology. I really liked CHM/100 - health science in chemistry.

-- I took organic chemistry at Harper because I failed it at NIU. I learned a great deal more in organic chemistry at Harper. There is more one on one teaching style which was very helpful.

-- More lab work - an increased awareness of the applications of chemistry.

-- I wish you would add a basic biochemistry with or without a lab -- a transfer course. Your instructors I feel are excellent! Even though I enjoy Chemistry, it is one of those classes I do not do well in and your instructors sure guided me along.

-- More comprehensible and student oriented instructor vs. text oriented.

-- Maybe more emphasis on thermodynamics theory - Possibly an intro to collaidcil properties and their sources of potential energy, i.e., relation of vanderalle fever to coagulation, and barrier due to repulsion forces. Where the forces come from and how they apply. Overall - great selection of texts, Zumdahl and McMurray.

-- I have taken inorganic and organic chemistry at Harper College. I feel that inorganic chemistry was satisfactory. But organic chemistry - particularly in CHM/205, we did not touch many chapters from the book which are related to biochemistry. If you can cover those chapters that are helpful for students because many students are majoring in field biochemistry. In inorganic chemistry, many instructors do not require students to memorize many formulas, such as changes and formulas of compounds and changes on them. Many of the teachers give the permission to students to use a whole page, whatever the student wants to write and use in exams. This is not a favor for students, because they do not learn how to apply theory and formulas on bachelors.

-- More advanced biochem and pharmacology will be part of my program. I expect to be very well prepared after these chemistry courses. General Chemistry - very supportive and available instructor!

-- Better teachers - not as strict a grading policy.

-- Although my second semester of chemistry was taught by a very good instructor, my first semester was taught by one of the poorest instructors I have ever had. I had a good background in chemistry so I was able to perform well in class, but others with minimal background had a difficult time in the class due to the instructor.

-- My teacher was chemist and he treated us like we were too. He seemed to forget that we were just learning this course. He was a terrible teacher and the course did not seem to apply at all!

-- I would have preferred computer written test instead of hand written.

-- Nothing - I thought the course at Harper was taught much better than here as SIUC.

-- Teachers need to slow down and take time in explaining the math part.

-- Was very dissatisfied with the instructor.

Comments -- Suggestions for Improvement (cont'd)

-- I feel that how you do in the courses is too dependent on the teachers. One professor I had made the course extremely hard and I disliked the course very much. Maybe a more standardized set of tests or a more definite standard of what should be expected of students should be set.
-- I was very satisfied with the program.
-- Hire more chemistry instructors like Mr. Wernert.
-- I was very pleased with it.
-- Felt the teacher had good teaching methods but her English was hard to understand.
-- Make sure students understand balancing equations very well before going on to other subjects. Also, teach more about batteries, energy, and electricity instead of doing a quickie section at the end.
-- For better understanding, I think the professors should relate the subject to other things - for example: showing chemistry in clinical fashion - possibly relating to medicine.
-- The courses were well structured. The professors were excellent - Harper was a great choice for me. I graduated with a BSEE from U of I, Champaign/Urbana.
-- I feel that the experience I gained in organic was more than prepared me for my graduate level biochemistry and molecular biology. Keep up the good work!
-- I has been a while but maybe more tutors available for help.
-- Nothing - Ms. Kuehn was my instructor for CHM/121, and she had the class extremely well organize. She was able to communicate difficult concepts and offered activities to reinforce the ideas. Although the class was challenging, it made me feel extremely accomplished and successful! Thanks!
-- Nothing - keep the strong inter-personal contact with the student body.
-- A lot more emphasis on organic lecture and less on lab because if you do not truly understand what you are doing in lab your results tend not to mean much to you.
-- More clearly understood department written lab manuals.
-- Offer 204 and 205 every semesters. If one withdraws for a good reason from either one they have to wait one year to take it again - should be offered every semester.
-- Wish more hours would transfer to new school - U of I. Took 5 hours worth and only 3 transferred.
-- The instructors should explain in more detail and to the point. It is not the same as Biology Dept.
-- I think the teachers need to explain and help students in every part of chemistry. My first chemistry class the teacher would not explain the answer to questions and just assumed we all knew the answer.
-- It was too long ago for me to remember details.
-- Hire more teachers like Mr. Oester.
-- Better explain expectations for course.
-- Make the test more like the class discussion - difficulty - material. In my class, the teacher was great but after the first test or during the test, many people walked out in disgust and when the second one was being tried by many the others left with harsh feelings.
-- I do not think you could -- Julie Kuehn and Duane Sell are outstanding chemistry teachers.
-- Lab exams.
-- My satisfaction is based on a personal dislike for chemistry - not on instructors!
-- I cannot think of anything. I felt the course teacher was great. I did feel the people who did graphing calculator programmed the formulas in them - was unfair. Otherwise, course was fine.
-- Nothing - it prepared me well for the MCAT (Medical College Admissions Test) exam.
-- More tutor time for chemistry available.
-- Teachers with more experience - lab manuals that have clearer instructions.
-- Better teacher instruction - teaching how to do equations from the book.
-- Wish that course 131 and 132 would have covered more about organic chemistry to prepare for the organic courses.
-- It would help if the instructor would go over more problems in the chapter - on the board or on an overhead. It was difficult to tell if I was on the right track doing them by myself.
-- Feel the course was very informative - the only thing I would recommend is a more step-by-step process in equations and such by the instructor.
-- Nothing - I thought it was pretty thorough and well taught.

Comments -- Suggestions for Improvement (cont'd)

-- Perhaps a little more focus on applications and execution of problems and usage of chemistry. I felt the class - for the most part - was only skin deep - too much focus on "what" not on "how" or "why".
-- Better lectures - better text - better tutoring facility.
-- Mrs. Weil was a great teacher!
-- Would make the lab experiments relate to things that the students can identify with - in my class, the lab time was fun but it would have been more useful and easier to remember, understand and conceptualize.
-- When I went through inorganic, organic chemistry I had great teachers - Macaulay, Sell, Oester. As far as improving, I cannot see how you can improve on how these teachers taught, but care must be taken - cannot be stressed enough - on hiring part-time teachers. I have heard some complaints in this area. I am not saying hire only full-time teachers. I understand Harper's constant push for part-time teachers, but I also hate to see the department that I thought was the best deteriorate -- Thanks!
-- Very satisfied with Professor Oester teaching ability for general and organic chemistry.
-- I feel that my chemistry background from Harper was excellent and I would not change a thing. I go to NIU now and the Chemistry Department there is a joke compared to the Chemistry Department at Harper. I plan on being a bio-chem minor next semester because of the great chemistry education at Harper. Keep up the good work.
-- Nothing - I enjoyed it very much!
-- I enjoyed organic chemistry at Harper. The course was well organized and the instructor was knowledgeable on the subject - no improvement is necessary.
-- From my experience with other labs I have taken after transferring to IIT to complete a degree in BSEE, Harper's labs and equipment were excellent in comparison.
-- Make the labs follow more closely to what is given in the lectures. More information in practicalities that are taught in the class lectures.
-- Nothing - my teacher was wonderful.
-- Teacher was inadequate.
-- In 131 and 132 we often scratched the surface of physics and calculus - I think additional instruction for students less familiar in these areas is desirable. It remains to be seen just how well prepared I am although I feel very optimistic.
-- Better laboratory experiments.
-- More lectures into lecture hall instead of lab.
-- Need good lecture for comprehension CM/131 and 132 are difficult courses to understand. Explanation of the labs would also help. Many procedures are new to students and require help from instructor.
-- Do an introductory review - out of high school for a long time and had forgotten many things.
-- Eliminate the gap between colleges. Harper taught chapters 1-8 and university taught 10.
-- This course was OK - the only problem I had was with the instructor. She treated us like we were in grade school - at the age of 25, this was not appreciated.
-- The instructor was over qualified. He was not available for questions or clarification - the text was not all that helpful.
-- The students were given excessive work and not enough explanation.
-- This course was offered at Triton and I felt the professor was not as good as the Chemistry professors at Harper College.
-- Had a teacher with a strong accent which made it much more difficult to understand the already complex subject of chemistry.
-- A little more time spent on conversions.
-- The course and instructor were fine. I would take a look at materials needed to conduct experiments - re: test tubes, petri dishes, Bunsen burners, etc. Some were either missing or old and cracked.

Comments -- Suggestions for Improvement (cont'd)

-- Instructor was good.
-- I cannot think of anything at this time.
-- None - the course was well taught. I took chemistry at U of Iowa and Illinois State and I learned the most about chemistry at Harper.
-- Nothing - the course was probably the most interesting chemistry course I have ever taken. Thanks to Harper's course I was able to pass organic chemistry the first time unlike students who took this course at NIU.
-- The use of micro computer lab for some lectures.
-- Special attention needs to be paid to the use of TI calculators which are programmable to those who take the time to "learn" how to cheat. Instructors should be made aware of this phenomenon and actions should be directed at balancing the testing opportunities, i.e., if you allow everyone a "cheat-sheet" or use calculators that have been checked, everyone must rely on the same skills to pass the exams and can therefore be accurately ranked and graded.
-- The labs in CHM/131, 132, 204 and 205 were a bit too much like cookbook. They lack independent thought - I understand the cookbook experiments are needed to learn the tools of chemistry but maybe a few labs where the individual gets to create a hypothesis and test it.
-- A little more feedback from teachers with regard to homework left.
-- The one experiment using micro volume equipment did not seem to work very well. I wonder if this equipment was a good use of department funds.
-- I would not change anything - the lectures were full of information with excellent lab exercises that followed lecture.
-- I learned what I needed to know - the course was very well taught by my instructor and questions were well answered.
-- Instructors who are better communicators.
-- Nothing - I hate chemistry - but my last chemistry teacher made it interesting. Resources provided by the school were adequate. I was happy with overall effort made by teacher and school.
-- The two courses I took were very well taught. I just have not had to use hardly any of my chemistry knowledge in my engineering courses.
-- I was in CHM/110 and really enjoyed that class - material was very well explained and applicable to my field. But in CHM/131 - which I took for a while before I dropped - I had a very hard time understanding material. The instructor really knew his material but as I talked with others in the class we all agreed we had a very hard time understanding him.
-- More good teachers like Uma Hari.
-- I did not feel the need for improvement but would like to commend my professor for all the additional help I received. I have found that most of the professors at larger institutions cannot be bothered with students.
-- The teacher's English was difficult to understand.
-- Offer a little more flexibility to class schedules for night course work. Also tutoring lab hours more flexible for night course work.
-- Although I have not taken additional chemistry classes yet I believe that my chemistry class really changed my study habits for the better. As far as the course is concerned I do not have any suggestions in mind; however, I would be very interested in taking additional chemistry classes at Harper during the summer - hopefully organic will be offered this summer.
-- I think the course was in good shape. Adding lab reports and a paper on one of the lab experiments will be helpful.
-- I started enjoying Chemistry after taking it at Harper because all the professors were great and their teaching methods were good. I think the labs should be explained better. That seems to be the hardest part to understand and I would not recommend taking sections in summer because you learn too much too fast which is hard to retain.
-- Increase intensity of courses designed for transfer to university chemistry. Inorganic needs more help than organic.

Comments -- Suggestions for Improvement (cont'd)

-- I took organic CHM/204 with Professor Gadambe. She presented the course very well - I learned a lot from her. About the only suggestion - I though that five formal lab write-ups were quite a lot - maybe 2 or 3 formal labs would be more appropriate.

-- I believe that Julie Kuehn, CHM/121, was very good. She was probably one of the best teachers I had.

-- Make laboratory setting as individualistic as possible. Also more correlation between different aspects of labs. For instance, more emphasis should be placed on what would happen if certain conditions were changed. I believe this would make students become more aware of the process of experiments.

-- I don't feel there is a need to improve the course. The course was taught very well and in an orderly manner. I was very satisfied with my chemistry course.

-- CHM/122 is a difficult course to teach and Harper should be careful selecting instructors for the course. I regret taking this course with a part-time instructor who did not care about his students. I wish I would have enjoyed this course as much as CHM/121 and Organic 204 and 205.

-- Class size was very large. Lab was difficult for one instructor to supervise and assist.

-- Group work - clear explanations - practice exams - problems.

-- Teacher was going too fast - could not keep u.

-- I enjoyed the course - no improvements needed.

-- Felt the instructor could have taken more time explaining so the students could understand.

-- Experiments more interests - more interesting teachers - mine was retiring - a very nice man but obviously not too interested in chemistry any longer.

-- Chemistry is a difficult class - feel the teachers need to explain more of the work and problems. Found myself at the Tutoring Lab way too much. I think the teachers need to be more prepared to explain the material at our level and not at theirs - we do not have chemistry degrees - yet.

-- Julie Ellefson Kuehn was my professor and she did an excellent job - I dreaded chemistry - still glad it is over!

-- There is nothing I can recommend to improve the course. I feel that the small class size, intense laboratory experience and enthusiasm from the instructors prepared me very well for pharmacy school. I feel that I was more prepared and experienced than some of the students who went to large respected universities in Illinois. Thanks for doing such a great job.

-- More emphasis on lab work.

-- CHM/121 - it is very important to have good teachers at this level. Organic Chemistry - it is a challenging course but Dr. Oester presented it very well. But there has to be more practice and it would be good to give an incentive to homework - like credit or points - so it is not just for personal gain.

-- I would suggest a more thorough explanation of nuclear chemistry. It would have helped when I took nuclear physics. Professor Sell was an excellent teacher. He made learning easy and fun. I would suggest that you gear your classes toward that style.

-- Think it would be helpful if CHM/201 included more applications such as presentations of some sort to apply what we have learned as part of the objectives. Overall, I was pleased with the chemistry courses. The instructors were excellent.

-- Bring the course up to par with the State university level. If the class is part of a series, make sure it prepares people for the next class.

-- If possible, to restrict course class size to 15-20 students allowing for more one on one with teacher.

-- Keep the size of the class smaller. When I took 132, we had the entire lab filled and that made it harder to get some things done. I liked the fact that we had labs every week - it helps show applications to what you learn in class.

-- Have more research projects, field trips to chemical oriented industries - to give a wider range of ideas for chemical engineer majors.

-- Find out more about what the universities are teaching so that students can be more prepared.

-- I did not have a problem with the material - had a problem with the instructor in General Chemistry I and did a lot better in General Chemistry II.

Comments -- Suggestions for Improvement (cont'd)

-- Felt I got a lot out of my chemistry class -- it helped me with hygiene school and Mr. Dubois made chemistry easier to understand than most instructors. I did very well in the course and I hope others feel as good as I did after the course was completed. Mr. Dubois took the "scary" part out of the course and gave us a feeling that we could learn chemistry without pulling our hair out! I hope my comments have helped.
-- There were too many laboratory sessions -- should pare down the lab load.
-- Mr. Macaulay was one of the best instructors I had throughout my entire college education -- he made every topic thoroughly interesting.
-- Be careful about which part-time teachers you accept - some are good, some are not.
-- I thought the chemistry course I took was better than my chemistry classes at NIU. I think the name of my professor was Dr. Fenton. I found him very helpful and concerned that his students were grasping the material. What helped me in his class was doing problems during class and having him or other students helping each other out. I always understood the material before I left class instead of being sent home to figure it out on my own.
-- The lab was adequate - but it was too "cookbook". Just follow the recipe and get out of lab fast.

Ways not Prepared for or by the Class

-- Believe it was good enough for my needs in Nursing.
-- I was not confident in my balancing of equations, special situations seemed to come up making me confused about doing them correctly. Also, I was confused about what elements it was impossible to mix meaning where reactions did not occur.
-- Chemistry was the subject I did least well on for the Medical College Admission Test.
-- Course was more difficult that I expected.
-- Calculus should be a pre-requisite for all classes above General Chemistry.
-- Duane Sell is one of the best science teachers I have had all throughout school.
-- Organic 204 - too fast - one chapter a seminar. It should be broken up a little.
-- Inorganic Chemistry - calculations - Organic Chemistry - Organic reactions and basic.
-- I took both General Chemistry and Organic Chemistry at Harper and my teacher for General Chemistry was not helpful at all.
-- Math level was below NEC.
-- The course work in 131 and 132 seemed to cover everything that I believe will prepared me for future use.
-- Math.
-- I have never been comfortable with story problems that would be only unprepared area.
-- Understanding the equations.
-- Isotopes - unites of measure.
-- Lecture at Harper - vague.
-- Lab and Text
-- Human Chemistry
-- As far as what the class covered it was very thorough and concise - it is a very solid foundation for further chemistry classes.
-- I enjoyed the way the course and materials were presented. Hands-on experiments helped my understanding of the subject.
-- Again courses were not quite rigorous enough. Homework assignments were too short. Lab write up requirements not up to 4-year expectation.
-- Chemistry 122 was very tough and I did not learn much because I had a terrible instructor.
-- Pre-labs.
-- Teacher was not specific enough.
-- Did not feel that there was enough explanations and day-to-day experiences by teacher.
-- The time allotted for teachers to teach restricted them fro answering specific questions.
-- I did not complete the class due to a family crisis; however, I have my undergraduate degree and believe the Chemistry course work was very thorough.

Ways not Prepared for or by the Class (cont'd)

-- Same as above especially the basics such as the name structure of compounds and individual, elements, i.e., "H+, H-".
-- Organic Chemistry might want to update teaching style - use more updated materials - films, books, etc.
-- Found course extremely difficult and the course was not a major emphasis in my major after I completed it.
-- I get into the habit of not reading the text and depending only on lecture.
-- Second semester Chemistry was not in depth as first semester because I took during the summer.
-- As a returning student after 25 years, any science was a clear slate for me.
-- Lab reports.
-- I needed more knowledge of transaction metals.
-- CHM/110 was a good stepping stone for CHM/131 and 132.
-- It is hard to say for sure, because I have yet had to apply any chemistry.
-- I went to class only one day and then dropped all my courses.
-- I have a good background but the class did not include specific nursing application.
-- Organic is very different than General: One cannot compare.
-- Thermodynamic Theory - concepts and applications. Example: Maxwell Relations. Physics Department should have introduced Chemistry a little more.

Survey of Industries in the Harper College District
Concerning Employees Who Require a Chemistry Background of Employees

In the Harper College District, 1,211 employers having 50 or more employees were identified. The Chemistry Department identified 60 employers which they thought might have employees requiring a chemistry background. Two mailings were sent to these 60 companies producing 30 completed surveys or a 50 percent response rate.

Companies having employees requiring a Chemistry background

	N	PCT
Yes	14	46.7
No	16	53.3
	30	100.0

Companies which have positions requiring only an Associate Degree but with Chemistry

	N	PCT
Yes	8	26.7
No	22	73.3
	30	100.0

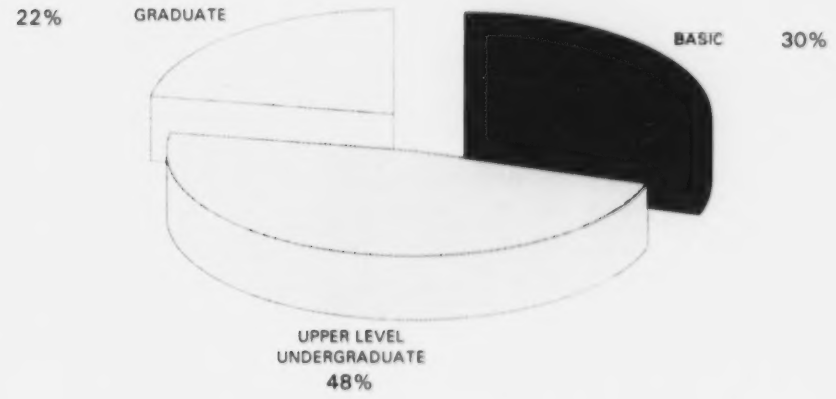
Number of employees in these 14 companies requiring a Chemistry background

	N	PCT
One	2	14.3
One to Two	1	7.1
Two	2	14.3
Two to Three	1	7.2
Three	1	7.1
Four	1	7.2
Five	2	14.3
Six	1	7.1
Thirty-one	1	7.2
Thirty-five	1	7.1
Fifty	1	7.1
Total	14	100.0
No. of Employees	149	

Level of Positions and Level of Chemistry Required

	Basic		Upper Level Undergraduate		Graduate		Total	
Level of Position	N	PCT	N	PCT	N	PCT	N	PCT
Technicians	25	56.8	8	11.1	0	0	33	22.1
Lab Professionals	7	15.9	22	30.6	2	6.1	31	20.8
Management	1	2.3	8	11.1	16	48.5	25	16.8
Engineers	1	2.3	17	23.6	3	9.1	21	14.1
Other Professionals	10	22.7	10	13.9	0	0	20	13.4
Researchers	0	0	7	9.7	12	36.3	19	12.8
Total	44	100.0	72	100.0	33	100.0	149	100.0
Percent	29.5		48.3		22.2		100.0	

LEVEL OF CHEMISTRY REQUIRED FOR POSITIONS REQUIRING CHEMISTRY



Companies who had hired employees educated
at Harper in positions requiring Chemistry

	Number of Companies	PCT	Number of Chemistry Positions Represented
Yes	2	6.7	66
No	28	93.3	---
Total	30	100.0	

All Harper educated employees had received a Bachelors Degree elsewhere and all were rated as well prepared for their job.

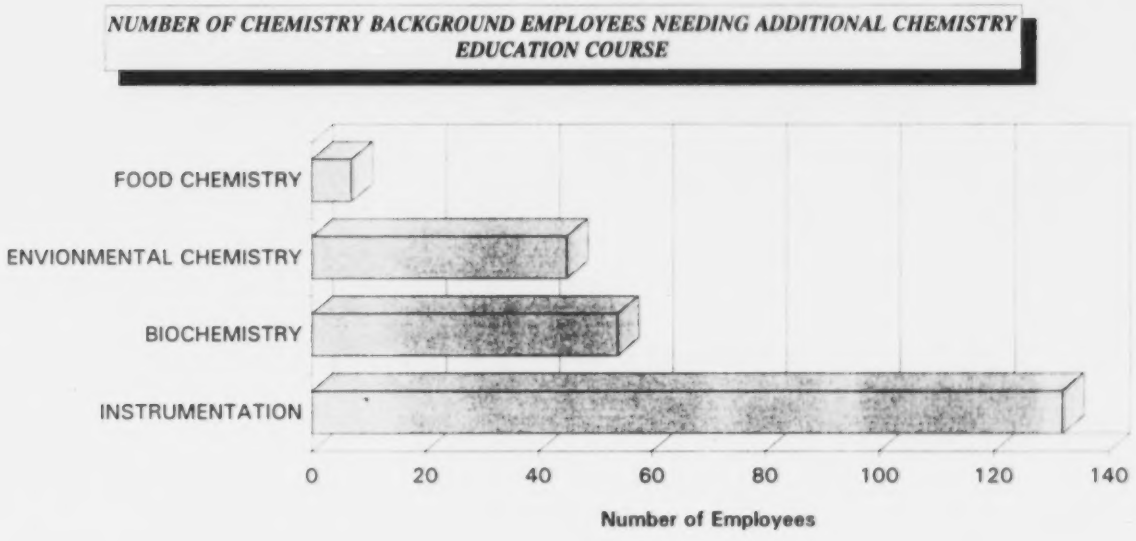
Trends companies see in the hiring of
future employees with Chemistry backgrounds

		Direction of Change*
--	Technician level - new employees	4.05
--	Associate degree - new employees	3.84
--	All new employees required a Chemistry background	3.89

* Direction of Change: 1 = Decreasing hires
4 = No change
7 = Increasing hires

Areas in which current employees
need additional Chemistry education

Chemistry Area	Number of Companies	Number of Chemistry Background Employees
-- Instrumentation	6	132
-- Environmental Chemistry	3	45
-- Biochemistry	2	54
-- Food Chemistry	2	7



APPENDIX

- SURVEYS

- COVER LETTERS

William Rainey Harper College
1200 W. Algonquin Road
Palatine, Illinois 60067
(708) 397-3000
TM/PS Division - Chemistry Department

Fall 1994

Dear Student:

The Harper College Chemistry Department is undergoing a Program Review, a college-wide cyclic process enabling departments/programs to evaluate themselves. We will analyze our strengths and weaknesses and make recommendations to improve the quality of the chemistry program.

We are seeking your input, as former chemistry students, in our review. Your responses are a critical component of our evaluation. Please complete the enclosed survey and return it in the reply envelope to the Office of Planning and Research.

Thank you for your cooperation. Any information you supply is kept strictly confidential and is used only in combination with responses from other students. The number on the survey enables us to take your name off of the mailing list when your completed response is received. This saves the cost of unnecessary mailings and saves you the bother of receiving a second copy of the survey and a follow up telephone call. We look forward to using your feedback to improve the quality of chemistry education at Harper.

Respectfully,
Duane Sell
Julie Ellefson Kuehn

Duane Sell and Julie Ellefson Kuehn
Chemistry Department Co-chairs

SURVEY OF STUDENTS COMPLETING CHEMISTRY AT HARPER COLLEGE

1- Have you taken any Chemistry courses at other institutions after completing Chemistry courses at Harper College? Check (x) **All** that apply.

____ A.	None	____ G.	Analytical Chemistry
____ B.	General Chemistry	____ H.	Instrumentation
____ C.	Biochemistry	____ I.	Environmental Chemistry
____ D.	Organic Chemistry	____ J.	Other - Specify _____
____ E.	Inorganic Chemistry		_____
____ F.	Physical Chemistry		_____

2- If you indicated you **did** take additional Chemistry courses at other institutions, how well did Harper prepare you for these courses? Check (x) **One.**

____ A. Very well prepared
____ B. Well prepared
____ C. Somewhat prepared
____ D. Not prepared at all

Point out specific areas where you feel you were not prepared:_____
_____
_____

3- If you did transfer to another institution, what is your major field now?_____
_____

4- Why did you take this Chemistry course at Harper? Check (x) **the one** most compelling reason.

____ A. Required for degree program - which one?_____
____ B. To satisfy a lab science requirement.
____ C. Have a particular interest in this Chemistry course.
____ D. A general education elective
____ E. Other - specify _____
_____

5- If this Chemistry course was required for your degree program, to what extent were you adequately prepared? Check (x) **one.**

____ A. Very well prepared
____ B. Well prepared
____ C. Somewhat prepared
____ D. Not prepared at all

Point out specific areas where you feel you were not prepared: _____
_____
_____

6- Again, if this Chemistry course was required for your degree program, what connection do you see between this Chemistry course at Harper College and your degree major? Check (x) **one.**

____ A. Very close relation
____ B. Close relation
____ C. Somewhat related
____ D. Not related

7- How satisfied were you with this Chemistry course at Harper College? Check (x) **one.**

____ A. Very satisfied
____ B. Satisfied
____ C. Somewhat satisfied
____ D. Not satisfied at all

8- What would you suggest to improve the course?_____

_____

_____

_____

_____

THANK YOU for completing this survey - your feedback is important to Harper College.

William Rainey Harper College
1200 W. Algonquin Road
Palatine, Illinois 60067
(708) 397-3000
TM/PS Division - Chemistry Department

Fall 1994

To Whom It May Concern:

The Harper College Chemistry Department is undergoing a Program Review, a college-wide cyclic process enabling departments/programs to evaluate themselves. We will analyze our strengths and weaknesses and make recommendations to improve the quality of the chemistry program.

We realize the need to establish strong connections between academia and industry. Our students deserve preparation for a successful transition into the workforce. Therefore, we are seeking your input into our review process. Please complete the enclosed survey and return it in the reply envelope to the Office of Planning and Research.

Thank you for your cooperation. Any information you supply is kept strictly confidential and is used only in combination with responses from others. The number on the survey enables us to take your name off of the mailing list when your completed response is received. This saves the cost of unnecessary mailings and saves you the bother of receiving a second copy of the survey and a follow up telephone call. We look forward to using your feedback to improve the quality of chemistry education at Harper. We would also like to maintain open communication channels to assist each other in providing the best education possible for our students.

Respectfully,
Duane Sell
Julie Ellefson Kuehn
Duane Sell and Julie Ellefson Kuehn
Chemistry Department Co-chairs

SURVEY OF INDUSTRIES IN HARPER COLLEGE'S DISTRICT

1- Does your facility have positions that require Chemistry? Check (x) one.

_____ A. Yes - About how many?_____

_____ B. No

2- If yes, at what level are those positions and what level of Chemistry is required? Check (x) **All** that apply.

	Level of Chemistry		
Level of Position	Basic	Upper Level Undergraduate	Graduate
A. Management	_____	_____	_____
B. Researchers	_____	_____	_____
C. Engineers	_____	_____	_____
D. Lab Professionals	_____	_____	_____
E. Other Professionals	_____	_____	_____
F. Technicians	_____	_____	_____

3- Does your facility have positions requiring only an associates degree but with Chemistry? Check (x) one.

_____ A. No

_____ B. Yes - list some of the job titles _____

_____

_____

List required Chemistry courses besides Basic:_____

_____

_____

4- Have you ever hired anyone who was educated at Harper College in a position requiring Chemistry? Check (x) one.

_____ A. Yes

_____ B. No

5- If **Yes,** what was their situation? Check (x) all that apply.

_____ A. Their only higher education was at Harper College.

_____ B. They started at Harper College but completed a bachelors degree elsewhere.

_____ C. They started at Harper College but completed a graduate degree elsewhere.

6- Again, if **Yes,** how well prepared were they for the position at your facility? Check (x) one.

_____ A. Very well prepared

_____ B. Well prepared

_____ C. Somewhat prepared

_____ D. Not prepared at all

Specify specific areas in which they were **not** prepared:_____

_____

_____

_____

What trends do you see for your facility in the future, in terms of positional level, educational level Chemistry background of new hires? Circle the appropriate number for the next three items:

7- Hiring of technician-level new employees

Decreasing hires 1 2 3 4 5 6 7 Increasing hires
no change

8- Hiring of associate degree new employees

Decreasing hires 1 2 3 4 5 6 7 Increasing hires
no change

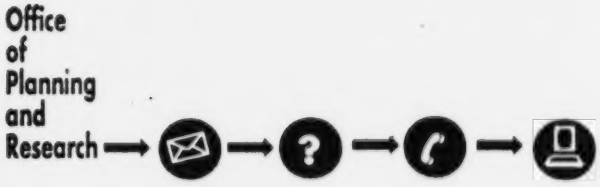
9- Hiring of new employees with required Chemistry background

Decreasing hires 1 2 3 4 5 6 7 Increasing hires
no change

10- Check the areas in which your current employees need additional Chemistry education. Check **All** that apply.

_____ A. No more needed
_____ B. Environmental Chemistry
_____ C. Instrumentation
_____ D. Biochemistry
_____ E. Other - Specify _____
_____
_____

William Rainey Harper College
1200 West Algonquin Road
Palatine, Illinois 60067-7398



Operational Staff:

Janice Cook, Administrative Secretary
Cal Meltesen, Research Analyst
Karla Hill, Research Clerk
Donna Woodruff, Clerk
Susannah Swift, Clerk

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